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(54) **SILICON PHOTONIC WAVEGUIDE BIOSENSOR CONFIGURATIONS**

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(57) **ABSTRACT**

Methods and devices relating to sensors and sensor blocks for use in detecting and monitoring molecular interactions. A silicon waveguide sensing element is provided along with a layer of silicon. A silicon oxide layer is also provided between the waveguide element and the layer of silicon. The sensing element is adjacent to an aqueous solution in which the molecular interactions are occurring. A light beam travelling in the silicon waveguide creates an evanescent optical field on the surface of the sensing element adjacent to the boundary between the sensing element and the aqueous medium. Molecular interactions occurring on this surface affect the intensity or the phase of the light beam travelling through the waveguide by changing the effective refractive index of the medium. By measuring the effect on the intensity, phase, or speed of the light beam, the molecular interactions can be detected and monitored in real time. Various configurations using this sensor technology is also disclosed.